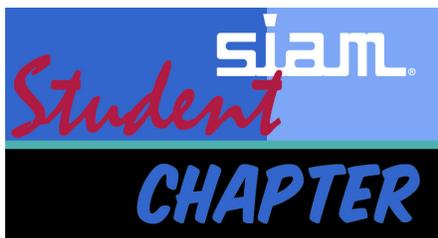


2013 SIAM CSU Newsletter



Another busy year!

Hello Chapter Members and Supporters! Yes, it was in fact another very busy year for the SIAM CSU Student Chapter. We had a number of great events, including workshops, speakers, and social engagements. I invite you to read more about these events in the articles that follow.

However, I would like to highlight one particular event here, the Front Range Applied Mathematics student conference (FRAM). Worth special mention is the exceptional number of chapter members that participated this year. We had 10 chapter members speak and even more attend. To put this into perspective, Colorado State University (CSU) chapter members accounted for nearly one third of all talks and only one chapter had as many members attend. As a still young chapter (only our second full year of existence), this level of engagement and involvement of chapter members is very encouraging.

The success of our chapter is in great part due to the support of the Society for Industrial & Applied Mathematics (SIAM), the SLiCE office, the Mathematics Department, and many members of the CSU community. Too many members of the CSU community supported our chapter this year to list them all here, but we are particularly grateful to the guidance and support provided by Lori Ziegelmeier, Karena Alons-Topf, Sheri Hofeling, Prof. James Liu, Prof. Jennifer Mueller, Prof. Louis Scharf, and so many more!

As this year concludes, we look to the next and it is with great excitement that I announce next year's chapter officers:

- President: *Tim Marrinan*
- VP: *Farrah Sadre-Marandi*
- Secretary: *Tegan Emerson*
- Treasurer: *Brent Davis*
- Liaison: *Melissa Swager*
- Webmaster: *Bahaudin Hashmi*

Congratulations to our newly elected officers! I encourage all members with ideas for activities and faculty that might be interested in partnering with the chapter for an event to contact one of our new officers.

Lastly, as the outgoing president, I am grateful for the experience of serving the chapter. SIAM student chapters afford many great opportunities for members (including free membership in SIAM). This newsletter will highlight many of the benefits of membership, but for more information please see our website (www.math.colostate.edu/~siamcsu/) or talk with another member. I encourage all interested student in Mathematics or a related discipline to become an active member.

*Sincerely,
Eric Hanson
Chapter President*

Technical Workshop Series

by BRENT DAVIS

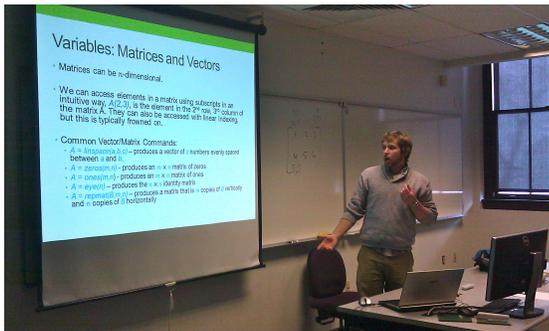
This year brought in a fresh set of free technical workshops aimed at chapter members and math undergrads. Fall semester ran two simultaneous \LaTeX workshops. One was geared toward beginners to \LaTeX while the other workshop covered more advanced topics such as



In the fall semester, Daniel Brake discusses how to make a professional poster with \LaTeX .

graphics generation in Inkscape, and the Beamer package which supports generation of posters and presentations.

Free resources for beginning \LaTeX as well as links to templates for Colorado State University theses and dissertations are available on the chapter website. The chapter thanks math alum Daniel Brake and physics alum Leif Anderson for providing these templates.



In the spring semester, Tim Marrinan ran a beginner workshop in MATLAB for chapter members and undergraduates.

Spring semester brought in another round of MATLAB workshops. In the beginner session, Tim Marrinan provided valuable information about MATLAB to interested math undergraduates. This beginner workshop was such a hit it ran for another session the following week! The advanced workshop focused on MATLAB's debugger and profiler tools, as well as topics related to LAPACK. The aim was to help students understand how to debug MATLAB code, optimize it, and understand the advanced linear algebra routines LAPACK offers to MATLAB. Free resources for beginning and more advanced MATLAB are available on the chapter website.

The chapter hopes to continue running biannual workshops and grow the quantity of available resources such as demos, lecture slides, and templates. Many resources are now available to the chapter on the chapter website (www.math.colostate.edu/~siamcsu/).

The 9th FRAM SIAM Conference

by SOFYA CHEPUSHTANOVA

The five Front Range SIAM Student Chapters (including our chapter!) sponsored the 9th Annual Applied Mathematics Regional Student Conference, held on March 2nd at the University of Colorado-Denver. This conference is organized for undergraduate and graduate students who are interested in Applied Mathematics.

Most CSU chapter members not only attended the conference but also gave interesting talks about their research. Speakers included Brent Davis, Eric Hanson,

Steven Ihde, Jennifer Maple, Tim Marrinan, Francis Motta, Roberto Munos-Alicea, Matt Niemerg, Chuan Zhang, and Sofya Chepushtanova. About one third of all talks were given by our students. Some chapter members also served at the registration desk and chaired several sessions.

Dr. Loren Cobb of the University of Colorado-Denver, who has worked as a free-lance applied mathematician with different countries for over 20 years, was the plenary speaker. His lecture "Mathematics of Society and its Dysfunctions" was a success. Dr. Cobb talked about poverty, drug trafficking, corruption, refugee problems, population growth, wars, and about simulations of social response to extreme stress caused by these social problems. Mathematics for the social sciences is a field in its infancy where (despite the remarkable progress being made) new ideas are very much welcomed.



Chapter members: Brent Davis, Eric Hanson, Steven Ihde, Tim Marrinan, Matthew Niemerg, Farrah Sadre-Marandi, Chuan Zhang at FRAM helping out at the registration booth.

Participating in the conference was an interesting and enjoyable experience. It was worth spending one of those precious Saturdays to look at new research ideas and fields, share ideas with others, practice talks, make new connections, and get together with fellow grad school mates. The chapter looks forward to participating in the 10th conference next year. Members of the Chapter (and other students) are encouraged to participate; a call for papers is expected in early Spring 2014.

2012-2013 SIAM Speaker Series

by TIM MARRINAN AND BRENT DAVIS

For the 2012 – 2013 academic year, the chapter recruited young math researchers to share their work and give the current graduate students an idea of what to expect in math research post graduation. This speaker series was made possible through the generous support of SIAM, the Department of Mathematics at CSU, and Dr. Louis Scharf of the CSU Department of Statistics. The speakers were brought to campus through collaborations with the CSU Applied Mathematics Seminar, The Institute for Learning and Teaching, and various mathematics faculty members, including Prof. James Liu. The chapter is grateful for these funding sources and collaborations with faculty.

Dr. Emilie Hogan

Pacific Northwest National Lab

The first speaker in the series was Dr. Emilie Hogan. During a two day stay in October, Dr. Hogan spoke about graph-based signature discovery, hosted a Q&A session about working at a national lab, and had a meeting with the students in CSU's Pattern Analysis Laboratory to explore possible areas for collaboration.

Dr. Hogan's talk focused on the problem of detecting intruders who are employing the "pass-by-hash" network attack within computer networks. Dr. Hogan and her colleagues use the problem to explore graph-based signatures. They have attempted to detect an attacker's signature using graph coarsening techniques and graph edit distance. The problem of detecting an attacker whose credentials keep changing within a computer network appears quite challenging.



Chapter members enjoying pizza while listening to Emilie Hogan discuss what it's like to work at Pacific Northwest National Laboratory.

The sheer quantity of data curated for Dr. Hogan and her colleagues to explore this problem prompted her to join the Pattern Analysis Lab for a conversation about data reduction techniques and possible areas for collaboration. While no projects have been established just yet, there has been ongoing communication between re-

searchers at the Pacific Northwest National Lab and the Pattern Analysis Lab.

Additionally, Dr. Hogan was able to have lunch with a large group of chapter members to discuss work in a national lab. She shared insights about what current grad students could focus on, while getting their degrees, that would improve their chances of getting a job. She also discussed what the day-to-day life of a research scientist is like. Many chapter members had probing questions for Dr. Hogan, and her detailed answers were much appreciated.

Dr. Elizabeth Munch

Duke University

In November, the chapter was joined by Elizabeth Munch, at the time a PhD candidate at Duke University and soon to be a postdoctoral fellow at the Institute for Mathematics and its Applications (Minneapolis, MN). She spoke to the chapter about the fast-growing field of persistent homology. Specifically Dr. Munch uses dynamic persistent diagrams, called vineyards, to understand the behavior of moving point clouds. The talk included a discussion of how to create a framework for probability on the space of vineyards.

As computational topology has become a hot item in the past few years, Dr. Munch's talk was attended by a large portion of the chapter and we were very happy to host her. Dr. Munch also participated in a further discussion of her research over lunch with some chapter members.

Dr. Russ Thompson

Texas A&M

Also in November, the chapter hosted Dr. Russ Thompson from Texas A&M. Dr. Thompson gave a talk titled *An Application of the Abelian Sandpile Model to Random Walks on Groups*. The basic idea of the model is that "grains of sand" will accumulate at a vertex and cause an "avalanche" that distributes throughout the graph. Dr. Thompson discussed applications of this model to the Matrix-Tree theorem and showed how the model can be used to understand random walks on certain groups.

At the time of the colloquium Dr. Russ Thompson was a postdoctoral fellow at Texas A&M. He now works at Crowdflower, a startup company in San Francisco, California that specializes in crowd sourcing.

Dr. Shiyuan Gu

Argonne National Lab

At the end of February, the chapter, in collaboration with the CSU Applied Math Seminar, were joined by

Dr. Shiyuan Gu of Argonne National Lab. Hailing from Zhongshan, China, Dr. Gu has an impressive resume for such a young researcher. Since earning his PhD in 2012, he has been working as postdoctoral researcher at Argonne National Lab. This particular talk discussed C^0 Interior Penalty Methods for Cahn-Hilliard Equations. Cahn-Hilliard equations are nonlinear fourth-order partial differential equations describing the phase separation phenomena. Dr. Gu presented C^0 interior penalty methods for Cahn-Hilliard equations which are discontinuous Galerkin finite element methods that use Lagrange finite elements for higher order equations. It was clear from the talk that Dr. Gu had an incredible breadth of knowledge on the topic of finite element methods, which have been of particular interest to many chapter members.

After his presentation, Dr. Gu joined some of the chapter members for lunch in Old Town Fort Collins to further discuss his research. He also gave insights into what portions of his career he felt best prepared him for being a research scientist and landing a position at a prestigious lab.

This Chapter Knows How to Roll!

by STEVEN IHDE

The music was blaring an eclectic mix from varying genres. The floor gleamed a bright blue reflecting the spinning and flashing lights. A few people zoomed by, seemingly coasting on air. Underneath the din, a distinct sound could be heard clearly... the continuous clacking of polyurethane on wood. It was time to put on our skates.

In October, the chapter set up a rollerskating social at Rollerland, the local rollerskating rink in Fort Collins, CO. The goal: to have fun and socialize in a non-school environment. This event was a huge success as the chapter members were able to get out and let loose. Sure, we could have sat around talking about rotational inertia and the coefficient of static friction of the wheels, but we didn't. For most chapter members, the night was more about relieving mounting stress related to upcoming midterms and the dreaded task of seemingly endless grading.

It is easy, as graduate students, to sometimes forget that there exists a life outside of our offices and classrooms. While we all know that the work we do both as graduate teaching assistants and researchers in training is important, this was an opportunity to remember our mental health is just as important. This simple and fun activity really allowed us, as peers, to collaborate socially and form stronger bonds.

Members and their significant others came and went as they pleased. Some wore the traditional rollerskates



Chapter members: Michael Capps, Sofya Chepushtanova, Sarah Frei, Eric Hanson, Tim Hodges, Rashmi M, Eric Hanson, Tim Marrinan, and Rachel Meier having fun at the rollerskating social.

while others opted for rollerblades. The more coordinated students catapulted around the rink at breakneck speeds while a couple of first time skaters gripped the wall for dear life. In the end, there was a lot of laughter, a lot of smiles, and more than one call for "We should do this every semester!"

Attending SIAM AN13

Every year SIAM invites student chapters to attend *Student Days* at the SIAM annual meeting. All students can attend, but SIAM offers support for one chapter representative to attend. This year Brent Davis will represent our chapter.

Last year's annual meeting (AN12) was in Minneapolis, MN. *Student Days'* activities included a welcome reception for students, an industry panel, informal meetings with invited speakers, student talks, and professional development meetings. This year's annual meeting (AN13) will be held in San Diego, CA on July 8-12. *Student Days* at AN13 will include many of the same activities as well as expanded student presentation sessions.

Student presentation sessions are by invitation only. This year our chapter was one of twelve to be selected for this honor. Tim Marrinan will represent our chapter. His talk is titled, *The Flag of Best Fit as a Representative for a Collection of Linear Subspaces of \mathbb{R}^n , Possibly of Varying Dimension*.

Chapter members receive free membership to SIAM and thus reduced conference fees. If you're interested in attending SIAM conferences, consider joining the SIAM CSU Student Chapter and activating your free SIAM membership. Chapter members can also share with you ways to apply for funding to attend conferences.